CIRCUIT DESCRIPTION

CD-1P106-01
ISSUE 4B
APPENDIX 3AC
DWG ISSUE 9AC
DISTN CODE 1U90

13

OPERATIONS SUPPORT SYSTEMS
COMMON
SWITCHED MAINTENANCE ACCESS
SYSTEM NO. 5A
LOCAL TEST PORT AND DISTRIBUTION CIRCUIT

CHANGES

B. Changes in Apparatus (Components)

B.1 Added

Diodes CR52, 53-533E - FS-4, 13-App Fig. 6.

D. Description of Changes

D.1 Diodes CR52 and 53 are added to provide delay time to accommodate worst case timing and voltage for stage one distribution network.

D.2 Lead 1-45 connection to Sel Grd 1 is assigned B option and rated Mfr Disc., and A option reconnects lead 1-45 to Sel Grd and rates it standard.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 4172-GCC-EGS

CIRCUIT DESCRIPTION

CD-1P106-01
ISSUE 4B
APPENDIX 2B
DWG ISSUE 8B
DISTN CODE IU90

OPERATIONS SUPPORT SYSTEMS
COMMON
SWITCHED MAINTENANCE ACCESS
SYSTEM NO. 5A
LOCAL TEST PORT AND DISTRIBUTION CIRCUIT

CHANGES

B. Changes in Apparatus (Components)

B.1 Added

FA1-FA10 - Fuses 70A-FS16 - App Fig. 17.

FA - Lamp 2Y w/cap 66A - FS16 - App Fig. 17.

FA - Network 185A - FS16 - App Fig. 17

FA - Relay AF59 - FS16 - App Fig. 17

D. Description of Change

D.1 Fusing and alarm circuit FS-16 is added for frame arrangements for use with stage one distribution and network interface circuits.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 4172-GCC-EGS

Printed in U.S.A.

OPERATIONS SUPPORT SYSTEMS
COMMON
SWITCHED MAINTENANCE ACCESS
SYSTEM NO. 5A
LOCAL TEST PORTS AND DISTRIBUTION CIRCUIT

CHANGES

B. Changes in Apparatus (Components)

B.1 Added

Diodes CR14A, 14B, 15A, and 15B.

D. Description of Changes

D.1 The circuitry is changed to provide timing to SMAS 5B interface circuit SD-99641-01 during the release sequence upon receipt of REORDER, and to remove the sneak path to the CM( ) relay.

D.2 Contact 5 of relays REO A and REO B are removed.

D.3 Contact 7 of relays SEL A and SEL B are added.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 4131-GCC-EGS

CIRCUIT DESCRIPTION

CD-1P106-01
ISSUE 4B
DWG ISSUE 6B
DISTN CODE 1U90

OPERATION SUPPORT SYSTEMS COMMON SWITCHED MAINTENANCE ACCESS SYSTEM NO. 5A LOCAL TEST PORTS AND DISTRIBUTION CIRCUIT

TABLE OF CONTENTS

	PAGE
SECTION I - GENERAL DESCRIPTION	1
1. PURPOSE OF CIRCUIT	1
2. GENERAL DESCRIPTION OF OPERATION	1
SECTION II - DETAILED DESCRIPTION	1
1. GENERAL	1
2. LOCAL ACCESS CIRCUIT (FS1)	1
3. DISTRIBUTION NETWORK CIRCUIT (FS2)	1
4. LOCAL TEST PORTS (FS3)	1
5. MONITOR AMPLIFIERS	2
6. LOCAL TEST KEY	2
7. TESTING KEYS	2
8. RELEASE - W OPTION	4
9. RTS 5A CONTROL - V OPTION	4
10. RELEASE - V OPTION	4
11. RESET TIMER	4
12. LOCAL ACCESS CONTROL CIRCUIT	4
13. DISTRIBUTION NETWORK INTERCONNECTION CIRCUIT (FS5)	4
14. ALARM CIRCUIT (FS6)	4
15. STAGE 1 DISTRIBUTION MODULE PANEL CIRCUITRY	5
16. MODULE (0) CIRCUITRY (FS7)	
17. MODULE ( ) (FS8)	5
18. LOCAL TEST PORTS (FS9)	5
19. LOCAL ACCESS CONTROL CIRCUIT (FS10)	6
20. LOCAL ACCESS AND CONTROL CIRCUITRY (FS11, 12, AND 13)	6
21. MAINTENANCE CONNECTOR NETWORK INTERFACE CIRCUIT CONTROL (FS14) - D OPTION	6
22. MAINTENANCE CONNECTOR NETWORK INTERFACE CIRCUIT EXPANSION STEERING CIRCUIT (FS15) - D OPTION	6
23. BLOCK DIAGRAMS	6
SECTION III - REFERENCE DATA	1
1. WORKING LIMITS	1
2. FUNCTIONAL DESIGNATIONS	1
3. FUNCTIONS	1
4. CONNECTING CIRCUITS	2
5. MANUFACTURING TESTING REQUIREMENTS	2
SECTION IV - REASONS FOR REISSUE	1

SECTION I - GENERAL DESCRIPTION

1. PURPOSE OF CIRCUIT

1.01 The Switched Maintenance Access System 5A (SMAS 5A) local test port and distribution circuit is designed to provide switched maintenance access in offices with special service circuits. Access is achieved by means of type 2 (SD-1C454) and type 3 (SD1C605) maintenance connectors or the controller and connector circuit (SD-99560). Maintenance testing is accomplished from a common set of jacks at a local test port (LTP) panel (SD1P106) or jack key and lamp panel (SD-99645).

1.02 This circuit may be used in conjunction with Remote Test System (RTS) 5A, which extends the 1-person remote test capability of the Switched Access Remote Test System (SARTS) 1A to these offices. Alternatively, this circuit can be used in a stand-alone mode for circuit access within the office in which it is located.

1.03 The maximum size of stand-alone SMAS 5A is 2400 6-wire, 2400 4-wire, or 4800 2-wire access points. Since a general mix of circuits usually exists on a single system, the specific mix determines the maximum system size. When RTS 5A is provided, the maximum size of combined SMAS 5A/RTS 5A is extended to sixteen times the stand-alone size (38,400 6-wire, 38,400 4-wire or 76,800 2-wire).

2. GENERAL DESCRIPTION OF OPERATION

SYSTEM CONFIGURATION

2.01 A stand-alone SMAS 5A System consists of local test ports, a distribution network, and maintenance connectors, as shown in block diagram 1. The maintenance connectors are 24:1 concentration stages for 4-wire and 6-wire circuits and 48:1 concentration stages for 2-wire circuits.

2.02 The SMAS 5A distribution network provides the means to connect a specific port to a specific maintenance connector. A distribution network panel (J1P033AB) provides a two-test-port-by-five-maintenance-connector distribution capability. For a SMAS 5 System that requires only two test ports, these distribution network panels may be chained to achieve any system size within the size limitation that applies to stand-alone SMAS 5A or combined SMAS 5A/RTS 5A. For a SMAS 5A System with more than two test ports, a stage 1 distribution network is required. This stage 1 distribution network consists of one more stage 1 distribution panels (J1P033AD).

2.03 Each stage 1 distribution panel provides the means to interconnect up to ten test ports with configurations of distribution network panels.

2.04 The SMAS 5A local test port panel (J1P033AA) or jack key and lamp panel (J99359AP) and the SMAS 5A control relay panel (J1P033AC or J1P033AK) provide capability for two local test ports. This arrangement provides the means to select, access, and release circuits that terminate on the SMAS 5A network, establishes various high impedance monitor on split access configurations, and provides jacks for interconnection to office test equipment. The two local test ports on a single local test port panel or jack, key, and lamp panel briefly utilize a common local access circuit during an accessing sequence, but otherwise are totally independent. When an accessing sequence is completed or is denied, the local access circuit is available for use by the other local test ports. The pair of local test ports may be used independently to test two separate circuits or they may be used to conveniently perform cross office testing between two access points on a specific circuit. For the stand-alone SMAS System, the local test ports are interconnected in a way to guarantee that one and only one local test port has control of the SMAS 5A accessing buses at a given time. When a specific local test port gains control of the SMAS 5A accessing buses, all other local test ports are prevented from entering the accessing state, even though one or more of these ports may be queued for access operations. When the local test port relinquishes control of the buses, control is transferred on a priority basis to the next local test port which is in queue. For combined SMAS 5A/RTS 5A, the RTS 5A microprocessor controller performs the scanning, queueing, and disabiling of the local test ports.

2.05 A combined SMAS 5A/RTS 5A System is comprised of one or more local test port panels or jack key and lamp panels, the same number of control relay panels, a local test port multing panel (if the number of local test ports exceeds two), one or more remote test ports, the RTS 5A controller, one or more stage 1 distribution panels, up to 80 distribution network panels, up to four network control interface panels, and up to 400 maintenance connectors. A block diagram of a combined SMAS 5A/RTS 5A System is shown in BD4 and BD5.

SECTION II - DETAILED DESCRIPTION

1. GENERAL

1.01 The detailed description of the circuit has been divided into a detailed presentation of each FS.

2. LOCAL ACCESS CIRCUIT (FS1)

2.01 This circuit provides information required for addressing the maintenance connector circuit, and consists of four thumbwheel switches. One dual decimal switch (thou) provides the address for GTB and TMB leads, a single decimal switch (hund) provides the address for the GTG lead, a dual decimal switch (tens) is used to provide a portion of the circuit address information, and a single decimal to binary switch (unit) is used to provide the rest of the circuit address information.

2.02 The SMAS circuit number provides the information for setting the thumbwheel switches. The first two digits (thou and hund) switches identify the maintenance connector, the thou switch provides a path from the SEL BAT and SEL BAT1 to the GTB and TMB leads. The hund switch provides a path from SEL GRD to the GTG leads. The last two digits (unit and tens switches) identify the circuit in the maintenance connector. The unit switch provides a path from SEL GRD to the unit relays 1, 1S, 2, 4, and 8 (W option). The tens switch provides a path from SEL GRD1 to the contacts of the unit relays (W option). Under V option this information is sent to the RTS controller. The operation of the unit relays determine the path that is set up for the SEL GRD1, which provides the selection of two out of eight codes on the A through E leads. Diodes CR39 through CR42 are used to detect ground appearing on the A through E leads; if no ground is present on any of these leads, the NSN relay (FS4) is operated.

3. DISTRIBUTION NETWORK CIRCUIT (FS2)

3.01 The distribution network circuit provides the means of interconnecting the LTP to any one of five maintenance connectors. This circuitry consists of ten relays mounted on a 4-inch plate. Relays K0 through K4 are associated with port A, and K5 through K9 with port B. Relays K0 and K5 are associated with the first maintenance connector, K1 and K6 with the second connector, K2 and K7 with the third connector, K3 and K8 with the fourth connector, and K4 and K9 with the fifth connector.

3.02 In the idle state ground is applied via leads ENABA and ENABB to the upper winding of the K relays, preventing them from being operated. The circuit is enabled by removing the ENABA lead if port A is being used or the ENABB lead if port B is being used. Operation of the circuit from port A is achieved by removing ground from the ENABA lead and applying ground on the GTG (0 through 4) lead through the 8 break of relay K (0 through 4) to the lower winding of the relay. Battery is then applied on TMB (0 through 4) lead through register R1 to the 5 break through CR (0 through 4) to the upper winding, operating the relay. Operation of the relay completes a holding circuit from -48 volts through R3, the 5 make, CR (0 through 4)A to the upper winding through the relay to the 8 make to the H or H1 lead to ground at port A. The operation of the relay completes a path on the following lead to the maintenance connector: T, R, T1, R1, EL, ML, ED, MD, CM1, and CM2.

3.03 On the back of the distribution network a terminal strip is provided where the addressing lead of the maintenance connector is strapped in accordance with Table A. The terminal strip also provides terminals for connecting battery and alarm leads for the maintenance connectors.

4. LOCAL TEST PORTS FS3

4.01 The local test ports (LTPs) provide the means for local control of the maintenance connectors. The LTPs consist of two ports, designated A and B. Both LTPs operate in the same manner, and for the purpose of understanding the circuitry only port A in the stand-alone W option mode of operation will be explained.

4.02 Upon application of battery to this circuit it is necessary to momentarily depress the RLS( ) nonlocking key. This applies ground through the 8 and 9 contacts of the RLS( ) key through the 9 break of the IDLE( ) relay through the coil of RLS( ) relay to -48 volts. Operation of the RLS( ) relay at this time performs the function of putting the circuitry in the idle state. This is accomplished by grounding through the RLS( ) relay 11 make through the coil of the IDLE( ) relay to R1( ), then to the 4 break of the BID( ) relay, and then to -48 volts, causing the IDLE( ) relay to be operated. This in turn causes the release of the RLS( ) relay by opening the 9 break of the IDLE( ) relay. As seen by the above description in the idle state, the only relay that is operated is the IDLE( ) relay.

4.03 An access attempt is started by momentarily depressing the nonlocking BID key, which completes the path from ground to the 8 make of the IDLE( ) relay to the 2-3 BID nonlocking key through the BID( ) relay coil to -48 volts. The operation of the BID( ) relay sets up its own locking path from ground in the back of the 8 fixed contact of the RLS( ) relay through the 8 break to the 2 fixed contact of the REO( ) relay through the 2 break to the 1 fixed contact of the SEL( ) relay through the 1 break to the 2 fixed contact of the BID( ) relay to the 2 make through the BID( ) coil to -48 volts.

4.04 The operation of the BID( ) relay also provides a path from ground through the contact 1 make through diode CR30( ) to the 5 fixed contact of the BID( ) relay to diode CR31( ) through the SEL( ) relay coil through R2( ) to -48 volts. This causes the SEL( ) relay to operate, provided ground is not present on the SEL INH lead. The operation of the SEL( ) relay sets up its own locking path from ground in back of the 8 fixed contact of the RLS( ) relay through the 8 break to the 2 fixed contact of the REO( ) relay through the 2 break to the 1 fixed contact of the SEL( ) relay through the 1 make to the 1 fixed contact of the TST( ) relay through the 1 break to diode CR31( ) to the SEL( ) relay coil to -48 volts.

4.05 The operation of the SEL( ) relay also puts the port in the select state and primes the access control circuit (see FS4) by operating the ACC lamp and ACC3 relay, which in turn operates the ACC2 relay. The operation of ACC2 (FS4) keeps the BID( ) relay, which has a slow release, from releasing by keeping the ground path to its locking circuit closed through its ACC2 1 make contact. With the BID( ) relay held operated, the TST( ) relay is prevented from operating by the BID( ) 3 break contact. The contact 11 make of the SEL( ) relay applies ground on the E or E1 lead to the distribution circuit. The circuit remains in the select state until the nonlocking ACC key (see FS4) is momentarily depressed.

4.06 The operation of the ACC key (see FS4) causes the ACC2 relay contact 1 make to open the locking path to the BID( ) relay, allowing the BID( ) relay to start releasing. Provided the BUSY, ALM, and NSN relays are released, the releasing of the BID( ) relay permits the circuitry to go from the select state to the test state by operating the TST( ) relay. The operating path for the TST( ) relay is from ground in back of the 8 fixed contact of the RLS( ) relay through the 8 break to the 2 fixed contact of the REO( ) relay through the 2 break to the 1 fixed contact of the SEL( ) relay through the 3 make to the 3 fixed contact of the BID( ) relay through the 3 break and the 8 break of the BUSY relay, the 9 break of the ALM relay, and the 1 break of the NSN relay to the coil of the TST( ) relay to -48 volts. The operation of the TST( ) relay sets up its own locking path from ground in back of the 8 fixed contact of the RLS( ) relay through the 8 break to the 2 fixed contact of the REO( ) relay through the 2 break to the 2 fixed contact of the TST( ) relay through the 2 make to the coil of the TST( ) relay to -48 volts.

4.07 The operation of the TST( ) relay 3 make provides a path from ground through the LT( ) 9 break, through the 10 break of the SPA( ) relay through the 3 break of the SPB( ) relay, and through the SPE 8 break S option to the MON( ) lamp to -48 volts, lighting the lamp. The TST( ) relay 3 make also completes a path to the 2W/4W TST( ) lamp R option or to the 6W TST( ) S option to -48 volts, lighting the lamp. The contact 4 make of the TST( ) relay continues to provide ground on the E or E1 lead to hold up the distribution network relay and maintenance connector. Contacts 5 through 12 of the TST( ) relay connects the T, R, T1, EL, ML, ED, and MD leads to the A and B jacks or the S jacks with S option.

5. MONITOR AMPLIFIERS

5.01 Monitor amplifiers are provided for use when a circuit has been accessed and is in the test monitor state. One amplifier is provided on the F( )A side and one on the F( )B side under control of the SPLA( ) and SPLB( ) relays. In the release condition of the relays the amplifier is in the circuit and the T and R leads of the A side and the EL and ML leads of the B side are routed through the amplifiers to the F( )A and F( )B jacks. The amplifiers provide a gain of approximately 24 dB to the signal to make up for the loss in the maintenance connector when in the monitor state.

6. LOCAL TEST KEY

6.01 Momentarily depressing the LT( ) nonlocking key while in the test state causes the LT( ) relay to operate. Ground is applied through the 2 make of the TST( ) relay to the LT( ) 2-3 nonlocking key to the MON( ) 8-7 nonlocking key to the coil of the LT( ) relay to -48 volts. The operation of the LT( ) relay sets up its own locking path from ground on the back of the relay TST( ) 3 make to the LT( ) 8 make through the MON( ) key 8-7 to the coil of the LT( ) relay to -48 volts. Ground through the 8 make of the LT( ) relay also completes a path to the LT( ) lamp to -48 volts, lighting the lamp. Operation of the LT( ) relay applies +24 volts through the LT( ) 12 make to the CM1 lead, and applies ground through the LT( ) relay 10 make to the CM2 lead. The application of battery and ground on the CM1 and CM2 leads operates the LT relay in the accessed maintenance connector, which through its contact completes a path for T, R to T1, R1 and EL, ML to ED, MD at the maintenance connector and these paths are completed through the system to the TST( ) relay to the A, B, and S jacks. This operation allows the tester to test from the LTP jacks to an accessed maintenance connector and back to the test jacks to ensure that the circuit is complete from the LTP to the maintenance connector and back. Operation of the MON( ) nonlocking key while in the local test state will cause the release of the LT( ) relay by breaking the path to the LT( ) relay coil at the MON( ) 7-8 contact. The releasing of the LT( ) relay will cause the MON( ) lamp to light by the completion of the path at the LT( ) 9 break.

7. TESTING KEY

7.01 Momentarily depressing the SPA( )/SPF( ) nonlocking key in the test state connects a path from ground to the 3 fixed contact of the TST( ) relay through the 3 make to the 9 fixed contact of the LT( ) relay through the 9 break to the SPA( )/SPF( ) key 2-3 contacts to the coil of the SPA( ) relay and the SPA( )/SPF( ) lamp to -48 volts, energizing the relay and lighting the lamp.

7.02 The operation of the SPA( ) relay sets up its own locking path from ground to the 3 fixed contact of the TST( ) relay through the 3 make to the 9 fixed contact of the LT( ) relay through the 9 break to the MON( ) key 3-4 contact to the 8 fixed contact of the SPA( ) relay to the 8 make through diode CR33( ) to the coil of the SPA( ) relay and SPA( )/SPF( ) lamp.

7.03 The operation of the SPA( ) relay through the 12 make applies -48 volts through the 10 break of the LT( ) relay to the CM2 lead. The -48 volts on the CM2 lead is applied through the system to the maintenance connector energizing the split relay. This causes the A side of the circuit to be split at the maintenance connector, and provides a path through the system for the accessed circuit from the maintenance connector to the local test port jacks.

7.04 Momentarily depressing the SPB( )/SPE( ) nonlocking key in the test state connects a path from ground to the 3 fixed contact of the TST( ) relay through the 3 make to the 9 fixed contact of the LT( ) relay through the 9 break through R option to the SPB( )/SPE( ) key contacts 2-3 to the coil of the SPB( ) relay to -48 volts or S option to the 11 fixed contact of the CM( ) relay through the 11 break to the SPB( )/SPE( ) key contacts 8-9 to the coil of the SPE( ) relay to -48 volts.

7.05 The operation of the SPB( ) relay R option sets up its own locking path from ground to the 3 fixed contact of the TST( ) relay through the 3 make to the 9 fixed contact to the LT( ) relay through the 9 break of the MON( ) key 3-4 contacts to the 1 fixed contact of the SPB( ) relay through the 1 make to diode CR34( ) to the coil of the SPB( ) relay to -48 volts. The operation of SPB( ) relay also completes a path from ground in back of the 2 fixed contact through the 2 make R option to the SPB( )/SPE( ) lamp to -48 volts, lighting the lamp.

7.06 The operation of the SPE( ) relay S option sets up its own locking path from ground to the 3 fixed contact of the TST( ) relay through the 3 make to the 9 fixed contact of the LT( ) relay through the 9 break to the MON( ) key 3-4 contacts to the 5 fixed contact of the SPE( ) relay through the 5 make to diode CR35( ) to the 9 fixed contact of the SPA( ) contact through the 9 break to the coil of the SPE( ) relay to -48 volts. The operation of the SPE( ) relay also completes a path from ground through the 6 make of the SPE( ) relay to the SPB( )/SPE( ) lamp to -48 volts, lighting the lamp.

7.07 The operation of the SPE( ) relay through the 12 make applies +24 volts through the 10 break of the LT( ) relay to the CM2 lead. The +24 volts on the CM2 is applied through the system to the maintenance connector, energizing the split relay. This causes the B or equipment side of the circuit to be split at the maintenance connector.

7.08 Momentarily depressing the SS( ) nonlocking key in the test state connects a path from ground through the 3 make of the TST( ) relay through the 9 break of the LT( ) relay through the 10 break of the CM( ) relay through the SS( ) nonlocking key 2-3 contacts to the coil of the SPE( ) relay to -48 volts, operating the SPE( ) relay. The operation of the SPE( ) relay sets up its own locking path from ground to the 3 fixed contact of the TST( ) relay through the 3 make to the 9 fixed contact of the LT( ) relay through the 9 break to MON( ) key 3-4 contacts to the 1 fixed contact of the SPB( ) relay through the 1 make to diode CR34( ) to the coil of the SPB( ) relay to -48 volts. The operation of the SPB( ) relay also completes a path from ground through the 2 make of the SPB( ) relay through the 8 break of the CM( ) relay to the SS( ) lamp to -48 volts, lighting the lamp.

7.09 The operation of the SPB( ) relay through the 5 make applies -48 volts through the 12 break of the LT( ) relay to the CM1 lead. The -48 volts on the CM1 relay is applied through the system to the maintenance connector energizing the split signaling relay. This causes the signaling leads to be split at the maintenance connector.

7.10 Momentarily depressing the MON( ) nonlocking key in the test state will return the circuit to the test monitor state and return the CM1 and CM2 to the idle state with ground on both leads. This returns the maintenance connector back to the monitor conditions.

8. RELEASE - W OPTION

8.01 Momentarily depressing the RLS( ) key will return the circuit back to the idle state (see paragraph 4.02).

9. RTS 5A CONTROL - V OPTION

9.01 When this circuit is used with the RTS 5A control circuit, SD-1P107-01, accessing and releasing the circuit is under the control of the RTS 5A. Upon momentarily depressing the BID( ) key, the BID( ) relay is operated, the 5 make provides a closure on the AB( ) and ABR( ) leads, and the RTS 5A responds by applying a closure across the PS( ) and PRS( ) leads. This in turn causes the SEL( ) relay to operate, starting the access sequence, which is the same as described under W option.

10. RELEASE - V OPTION

10.01 Under V option there are two methods in which a release can be achieved. One method is by momentarily depressing the RLS( ) key at the LTP, which will operate the RLS( ) relay and apply a closure across the RB( ) and RBR( ) leads to the control circuit. The controller will respond by applying a closure across the DISC( ) and DISCR( ) levels, which will cause the IDLE( ) relay to operate, putting the LTP in the idle state.

10.02 The other method is for the controller to apply a closure across the REO RET( ) and EXT REO( ) leads. This will operate the REO( ) relay, which will cause the REO( ) 2 break to release the BID( ), SEL( ), or TST( ) relay if operated. The REO( ) 3 make causes the RLS( ) lamp to be connected to the office interruptor circuit, which causes the release lamp to flash until the RLS( ) key is depressed.

11. RESET TIMER

11.01 The RTS 5A control circuit times the activity of the LTPs, and if after 15 minutes there is no activity, the controller will apply a closure across the RTL( ) and RTLR( ) leads, causing the RST TMR( ) lamp to light. If the RST TMR( ) nonlocking key is momentarily depressed the controller will be reset. If the RST TMR( ) key is not depressed within one minute, the controller will send a reorder to the LTP.

12. LOCAL ACCESS CONTROL CIRCUIT

12.01 The local access control circuit (FS4) provides the control circuitry to serve both LTPs. In the idle state all relays are released; momentarily depressing either BID( ) key at the LTP causes the operation of the SEL( ) relay (see paragraph 4.04). The operation of either SEL( ) relay provides ground from in backof the of the SEL( ) 5 make to the ACC lamp to -48 volts, lighting the lamp and enabling the ACC nonlocking key. Operation of the SEL( ) relay also causes the ACC3 relay to operate and the ACC3 12 make contact completes a path for the operation of the ACC2 relay. The operation of the ACC3 and ACC2 relays completes an operating path for the NSN relay through the SEL( ) 12 make through the ACC2 5 make W option or the ACC3 8 make V option through resistor R3 to the coil of the NSN relay to diode CR36 through RLSB and the RLSA 9 break to ground. The circuit remains in this state until the ACC nonlocking key is momentarily depressed causing the ACC1 relay to operate from ground through the SEL( ) 5 make through the 2-3 contact of the ACC key to the coil of the ACC1 relay to -48 volts. Operation of the ACC1 relay sets up its own locking path through the ACC1 make contact and the SEL( ) 5 contact. The operation of the ACC1 relay applies ground through the ACC1 1 make contact through diode CR49 to the SEL GRD lead and -48 volts through the contact 5 make to the SEL BAT lead. This ground and battery is used to operate through the system to the maintenance connector and it is during this time that the ALM, BUSY, and NSN relays are enabled by the ACC2 and ACC3 relays to determine if any of these condition excess at the maintenance connector. A ground on the ALM1 lead will operate the ALM relay and light the ALM lamp. A ground on the TPB lead will operate the BUSY relay and the BUSY lamp. A ground on the SEL relay will release the NSN relay if it is operated at this time. It should have been released by a ground applied on the A through E leads W option prior to this time, if a valid number has been accessed.

12.02 The operation of the ACC1 relay started the releasing of the ACC3 relay by its 1 break contact. ACC3 releasing starts the ACC2 relay releasing. If V option is used, ACC3 will not start releasing until the controller removes the closure across the AH and AHR leads. The releasing of the ACC2 W option or ACC3 V option causes battery to be applied to the SEL BAT1 lead if the BUSY and NSN relays are released.

13. DISTRIBUTION NETWORK INTERCONNECTION CIRCUIT (FS5)

13.01 FS5 shows the interconnections required for the type 2 and type 3 maintenance connectors and are shown here for information only.

14. ALARM CIRCUITS (FS6)

14.01 This circuit provides a means of reporting an alarm condition on the system to the local office alarm system or to a remote location. A closure across the ALM2 and ALM2R leads will operate the MN1 or MN2 relay, which will apply a closure across the relay contact to the office alarm circuit or to the telemetry circuit if required.

15. STAGE 1 DISTRIBUTION MODULE PANEL CIRCUITRY

15.01 The stage 1 distribution module consists of two miniature crossbar switches operated in a parallel arrangement to provide switching of the transmission and control leads to the maintenance connectors. There are two types of stage 1 distribution panels: one type is designated module (o) FS7 T option, with control relays mounted on the panel, and the other is designated ( ), without the control relays. This latter type of module is used to expand the number of test ports on the SMAS 5A System and connects to the module (o) type for control.

15.02 The stage 1 distribution panel module (o) is used when more than two LTPs are required on a stand-alone SMAS 5A. This module provides for the additional eight ports and can be expanded to a total of 20 ports by adding module ( ), which provides an additional 10 ports. The module is connectorized to terminate cables from the test ports, the distribution network panels, expansion stage 1 distribution modules, and in the combined SMAS 5A/5B RTS 5A arrangement, control cables from the RTS 5A.

16. MODULE (O) CIRCUITRY (FS7)

16.01 In the IDLE stage all of the relays in the stage 1 distribution panels are released. When the port initiates the access sequence, battery is sent on one of the GTB leads, operating the associated A path SEL relays. Operation of the SEL relay through the upper switch SEL O.N. (off normal) contacts operate the ENABA and ENABAB relays. Operation of the ENABA relay removes ground from the ENAB lead to the distribution network panels (DNPs) and applies it to the H or H1 lead. Operation of the ENABAB relay partially enables the HOLD relays. When battery is applied to one of the TMB address leads later in the sequence, the HOLD relays corresponding to the test port making the access will operate and remain latched between battery and the HOLD lead supplied by the test port. The operation of the HOLD relay causes the switch crosspoint to be cut through between the test port and the DNPs on that switch horizontal.

16.02 Similar operations occur at the stage 1 distribution panel each time the first access is required for SMAS number in a particular DNP configuration terminating on a stage 1 distribution panel horizontal pair. When a second access is required in the same DNP community, the A path is again tried for access, but operation of the SEL relays result in operation of the A relay due to the HOLD ground existing on that busy A path. This results in the operation of the associated B path SEL relays. This operates the upper SEL O.N., closing a path from ground to the ENABB and ENABAB relays and operating them. Operation of the ENABB relay removes ground from the ENAB lead and applies it to the H or H1 lead to the DNP. When battery is applied to a TMB lead later in the sequence, the HOLD relays will operate and latch, as in the previous case, cutting the test port through to the DNP community.

16.03 If both the A and B paths are busy into a DNP community, the B relay will also operate because of the HOLD ground existing on the busy B path. This results in a ground on the test position busy network bus, which results in a BUSY condition at the test port, and the access sequence is aborted before the battery is applied to a TMB lead.

17. MODULE ( ) (FS8)

17.01 The stage 1 distribution module ( ) panel expands the system so an additional ten LTPs can be added. All of the control relays for this module are located on the associated module (o) and interconnected, allowing this module to function the same as module (o).

18. LOCAL TEST PORTS (FS9)

18.01 This local test port circuitry is to be used in conjunction with the jack, key, and lamp circuit, SD-9645-01, the RTS 5A control circuit, SD-1P107-01, and the SMAS NO. 5B interface circuit, SD-99641-01, to provide the necessary relay control function to access a maintenance connector or the connector group.

18.02 In the idle state the IDLE( ) relay is operated and latched up by its own contacts. To initiate an access sequence to a maintenance connector the BID( ) key is momentarily depressed and a closure is sent to the control circuit on the AB( ) and ABR( ) contacts. The controller returns a closure on the PS( ) and PSR( )

leads, operating the SEL( ) relay. The 11 make of the SEL( ) relay applies ground to the H or H1 lead; the 5 make of the SEL( ) relay lights the ACC lamp (see FS10). The circuit remains in the select state until the ACC key is momentarily depressed. If it is not depressed within 15 seconds the control circuit will go to the reorder state and apply a closure on EXTREO( ) and REO RET( ) operating the REO( ) relay, which releases the SEL( ) relay and lights the RLS( ) lamp. To return back to the idle state the RLS( ) key must be momentarily depressed, which operates the RLS( ) relay, sending a closure to the controller on the RB( ) RBR( ) leads. The controller returns closures on the DISC( ) and DISCR( ) leads to operate the IDLE( ) relay. If the ACC key is momentarily depressed within 15 seconds, the address information will be sent by the control circuit. A ground will be applied on the Y lead to operate the CM( ) relay if a 2W/4W circuit is accessed. If a 6W circuit is accessed, then no ground will be applied and the CM( ) relay will not operate. The circuit will go to the test state provided the BUSY, ALM, or NSN has not operated. Once in the test state, the LT( ), SPA( ), and SPB( ) keys will function as previously described. If an access has been made to a DF circuit, a ground or an open could have been applied on the CC( ) lead to control the CM( ) relay from the SMAS No. 5B interface circuit; -48 volts on the RR( ) lead will operate the SPL( ) relay, indicating a special circuit has been accessed. The SEL( ) and N( ) leads to the interface circuit provide for the proper sequence to access the DF circuitry.

19. LOCAL ACCESS CONTROL CIRCUIT (FS10)

19.01 In the idle state all relays are in the release state, and upon initiation of the access sequence the ACC lamp is lighted by the operation of the SEL( ) relay. The ACC3 relay is also operated by the SEL( ) contacts. Operation of the ACC3 relay operates the ACC2 relay. Momentarily depressing the ACC key starts the sequence of sending the address information to the controller and the receiving status information back to indicate if the access circuit is in the ALM, BUSY, or NSN state. This is achieved by a ground on the ALM1 or TPB lead, which will operate the associated relay. A ground is required on the SEL lead if a valid access circuit has been accessed since the NSN relay must be in the released condition to indicate a valid access has been made.

19.02 After the information in paragraph 19.01 has been sent, the controller opens the path between the AH and AHR leads, which allows the ACC3 relay to start to release and in turn the ACC2 relay to release, completing the access sequence.

20. LOCAL ACCESS AND CONTROL CIRCUITRY (FS11, 12, and 13)

20.01 These FSs replace FSs 1, 3, and 4, performing the same functions except that the jack, key, and lamp circuit, SD-99656-01, replaces the LTP to initiate and control the operation of an access sequence.

21. MAINTENANCE CONNECTOR NETWORK INTERFACE CIRCUIT CONTROL (FS14) D OPTION

21.01 This circuit is controlled by the RTS 5A control circuit, SD-1P107-01, and has three input leads from that circuit. In the idle state all relays are released. During an access sequence the controller reads the first digit sent to it from the port and determines what conditions are to be sent to this circuit. In all cases a ground is applied to the FDEN lead if an access is to be a maintenance connector. Placing the ground on the FDEN lead causes the END relay to operate, which in turn operates the EN1 and EN2 relays, and depending on the condition of the A0 and B0 leads, the A0 and B0 relays will operate. The A0 and B0 leads have four combined states in which they may be: both open, A0 open and B0 closed, A0 closed and B0 open, and both closed. The operation of these leads determine the operation of the A1 through A6 and the B1 through B6 relays.

22. MAINTENANCE CONNECTOR NETWORK INTERFACE CIRCUIT EXPANSION STEERING CIRCUIT (FS15) - D OPTION

22.01 This FS, under the control of FS14, provides steering that enables the system to access any maintenance connector in the system, no matter which quadrant it may be located in. Information is received from the RTS 5A control circuit on the A1 and A2 leads and is routed to the quadrant determined by the relay operations in FS14, which are under control of the RTS 5A control circuit.

23. BLOCK DIAGRAMS

23.01 Five block diagrams are provided to show the connection of the various FSs for the stand-alone and RTS 5A arrangements with the LTPs, and the jack, key, and lamp panel. Through the use of the block diagrams, a complete system can be connected, since all the connectors are shown.

SECTION III - REFERENCE DATA

1. WORKING LIMITS

1.01 None.

2. FUNCTIONAL DESIGNATIONS

2.01 Keys

Designation	Meaning
ACC	Access
BIDA	Bid A
BIDB	Bid B
LTA	Loop test A
LTB	Loop test B
MONA	Monitor A
MONB	Monitor B
RLSA	Release a
RLSB	Release B
RST TRMA	Reset timer A
RST TRMB	Reset timer B
SPAA/SPFA	Split A/ split facility
SPAB/SPFB	Split B/ split equipment
SPBA/SPEA	Split B/ split facility
SPBB/SPEB	Split B/ split equipment
SSA	Split signaling A
SSB	Split signaling B

2.02 Lamps

2W/4W TSTA	2-wire/4-wire test A
2W/4W TSTB	2-wire/4-wire test B
6WTSTA	6-wire test A
6WTSTB	6-wire test B
ALM	Alarm
BUSY	Busy
NSN	No such number
SPLA	Special A
SPLB	Special B

2.03 Relays

A	A path
A0-A6	A0-A6
ACC1	Access 1
ACC2	Access 2
ACC3	Access 3
ALM	Alarm
B	B Path
B0-B6	B0-B6
BIDA	Bid A
BIDB	Bid B
BUSY	Busy
CMA	Class mark A
CMB	Class mark B
DF1A	Disturbing frame 1A
DFA	Distributing frame A
EN0-EN2	Enable 0-2
ENABA	Enable A
ENABAB	Enable AB
ENABB	Enable B
IDLE A	Idle A
IDLE B	Idle B
K0-9	Control 0-9
LTA	Local test A
LTB	Local test B
MN1	Minor 1
MN2	Minor 2
NSN	No such number
REOA	Reorder A
REOB	Reorder B
RLSA	Release A
RLSB	Release B
SELA	Select A
SELB	Select B
SPAA	Split A A side
SPAB	Split A B side
SPBA	Split B A side
SPBB	Split B B side
SPEA	Split equipment A side
SPEB	Split equipment B side
SPLA	Special A side
SPLAA	Amplifier control A circuit A side
SPLAB	Amplifier control B circuit B side
SPLB	Split B side
SPLBA	Amplifier control A circuit B side
SPLBB	Amplifier control B circuit B side
TMB	Timed battery
TSTA	Test A
TSTB	Test B
UNT1	Units 1
UNT1S	Units 1 slave
UNT2	Units 2
UNT4	Units 4
UNT8	Units 8

3. FUNCTIONS

3.01 Provides a means of sending address information to access a type 2 or type 3 maintenance connector or distribution frame circuit.

3.02 Provide a means of controlling the access circuit manually or from the RTS 5A control circuit.

3.03 Provides for expansion of the system for additional quadrants.

3.04 Provides for testing the transmission and signaling characteristics of the telephone network, once the circuit has been accessed.

4. CONNECTING CIRCUITS

(a) Type 2 Maintenance Connector - SD-1C454-01

(b) Type 3 Maintenance Connector - SD-1C605-02

(c) Remote Test Port 5A Control Circuit - SD-1P107-01

(d) Remote Test Port 5A Circuit - SD-1P108-01

(e) Jack, Key, and Lamp Circuit - SD-99645-01

(f) SMAS No. 5B Interface Circuit - SD-99641-01

(g) Phantom Maintenance Connector Circuit - SD-1P110-01

(h) Remote Maintenance Loop Circuit - SD-1P111-01

5. MANUFACTURING TESTING REQUIREMENTS

5.01 The manufacturing testing requirements are found in X-79255. In addition this circuit shall operate as described in Section II.

SECTION IV - REASONS FOR REISSUE

D. DESCRIPTION OF CHANGES

D.1 A circuit path is added through the distribution network and stage 1 distribution module for the following leads: HO and MB N option, TGTO M option for use with remote maintenance loop circuit.

D.2 Options K and J are added to access 2 and access 3 relays.

D.3 New relay control unit circuitry is added for use with RTS 5A for operation with SMAS 5B.

D.4 New FSs are provided to establish local test port operation using jack, key, and lamp panel J99359-AP and the relay control panel J1P033AC.

D.5 Local test port JIP033AA is rate Mfr. Disc.

D.6 Options E and F are added to relay control panel JIP033-AC to provide grounding of the sleeves of the A and B jacks on jack, key, and lamp panel J99359AD.

D.7 The TMB relay 1 break is removed and TMB 4 and 5 breaks are added to the stage 1 distribution circuit.

D.8 New maintenance connector network interface control and expansion steering circuit for use with SMAS 5B is added.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 4131-GCC-EGS